

Method for Integrated In-Situ Cleaning and Subsequent Atomic Layer Deposition Within A Single Processing Chamber

Abstract

[0042] A system and sequential method for integrated, in-situ modification of a substrate and subsequent atomic layer deposition of a thin film onto the substrate in an evacuated chamber comprising introducing at least one feed gas into the chamber; generating a plasma from the feed gas; exposing said substrate to ions and/or radicals formed by the plasma; modulating any ions; reacting the substrate with said modulated ions and/or radicals to remove any contaminants from the substrate and producing a modified substrate. These steps are followed, in-situ, by performing an atomic layer deposition of a thin film onto the modified substrate in the chamber including introducing a first reactant gas into said chamber; adsorbing at least one monolayer of the first reactant gas onto the modified substrate; evacuating any excess first reactant gas from the chamber; introducing at least one additional feed gas into the chamber, generating a second plasma from the additional feed gas; exposing the modified substrate to additional ions and/or radicals formed by the plasma; modulating any additional ions; and reacting the adsorbed monolayer of the first reactant gas with any modulated additional ions and/or radicals to deposit the thin film.